

### AMENDMENTS TO THE CLAIMS

Please amend claims, such that the claims of the application have the following formulations and statuses:

1. (Currently amended) A system for decoding channel signals having therein Reed-Muller coded information comprising:

- a plurality of soft-output devices, including first and second soft-output device devices, for processing [[a]] coded signal signals received thereby and for producing providing estimated values for code bit decisions bits represented in received coded signals and for providing code bit bits reliabilities based on the received coded signal signals, the first soft-input device for providing initial stage code bits estimated values and corresponding initial stage code bits reliabilities from corresponding channel coded signals; and
- a first Reed-Muller message passing device coupled to the first soft-output device for decoding the initial stage code bit decisions bits estimated values and decoding for using the initial stage code bit bits reliabilities into an information bit decision and an information bit reliability vector to provide estimated values of message bits and to provide corresponding initial stage message bits reliabilities therefrom;
- an assembler coupled to the first Reed-Muller message passing device for converting the initial stage message bits reliabilities to subsequent stage incoming code bits reliabilities corresponding to code bits in the corresponding channel coded signal;
- and
- the second soft-input device coupled to said assembler for providing subsequent stage code bits estimated values and for providing subsequent stage outgoing code bits reliabilities from the corresponding channel coded signal and the corresponding subsequent stage incoming code bits reliabilities.

2. (Canceled)

3. (Currently amended) The system of claim 1 further comprising[[:]]

~~an assembler for combining the message bit reliabilities into a reliability vector;  
a second soft-input device for processing the coded signal based on the code word  
reliability vector and for producing updated code bit decisions and updated code  
bit reliabilities based on the coded signal and the code word reliability vector; and  
a plurality of Reed-Muller message passing devices, including the first Reed-Muller  
message passing device and a second Reed-Muller message passing device, the  
second Reed-Muller message passing device coupled to the second soft-output  
device for decoding the subsequent stage code bits estimated values and for using  
the subsequent stage outgoing code bits reliabilities to provide corresponding  
subsequent stage message bits reliabilities therefrom. processing the updated code  
bit decisions and updated code bit reliabilities into an updated information bit  
decision and an updated information bit reliability vector~~

4. (Currently amended) The system of claim 1[[:]] wherein the channel coded signal is an interleaved coded signal, the system further comprising[[:]] a de-interleaver ~~positioned between~~ coupling the first soft-output device and the ~~Reed-Muller~~ first Reed-Muller message passing device for ~~recovering an original sequence of coded information from a received sequence~~ de-interleaving the initial stage code bits estimated values prior to the decoding thereof by the first Reed Muller message passing device.

5. (Currently amended) The system of claim 1[[:]] wherein the first Reed-Muller message passing ~~decoder device uses~~ provides the initial stage code bits reliabilities and the subsequent stage incoming and outgoing code bits reliabilities as log-bit reliabilities to evaluate the coded signal likelihoods.

6. (Currently amended) A method for decoding of a channel signal having messages encoded using a Reed-Muller code comprising:

generating a code bit vector and a log-bit probability vector based on a received coded signal initial stage code bits estimated values and corresponding initial stage code bits reliabilities represented by log-bit likelihoods from corresponding channel coded signals using a first soft-output device;

decoding the initial stage code bits estimated values and using the initial stage code bits reliabilities in a first Reed-Muller message passing device to provide therefrom estimated values of initial stage message bits and corresponding initial stage message bits reliabilities represented by log-bit likelihoods;

passing at least a representation of the log-bit probability vector initial stage message bits reliabilities to a second soft-output device; and

generating an updated code bit vector and an updated log-bit probability vector based on the received coded signal and at least the log-bit probability vector subsequent stage code bits estimated values and corresponding subsequent stage code bits outgoing reliabilities from the corresponding channel coded signal and the representation of the corresponding initial stage message bits reliabilities using the second soft-output device.

7. (Canceled)

8. (Currently amended) The method of claim 1 wherein the coded signal is an interleaved signal, the method further comprising de-interleaving the code bit vector and the bit reliability vector initial stage code bits estimated values and corresponding initial stage code bits reliabilities.

9. (Currently amended) The method of claim 8 further comprising converting and interleaving at least the codeword reliability for use in a next soft-output device the initial stage message bits reliabilities to

subsequent stage incoming code bits reliabilities corresponding to code bits in the corresponding channel coded signal as the representation of the initial stage message bits reliabilities.

10. (Currently amended) The method of claim 6[[,]] and further comprising[[[:]] ~~Reed-Muller decoding the updated code bit vector and an updated log-bit probability vector~~ the subsequent stage code bits estimated values and using the subsequent stage outgoing code bits reliabilities in a second Reed-Muller message passing device to provide therefrom estimated values of subsequent stage message bits and corresponding subsequent stage message bits reliabilities.

11. (Canceled)

12. (Currently amended) A soft iterative decoding system for decoding channel signals having therein Reed-Muller coded information comprising:

~~two or more~~ a plurality of decoding blocks for processing coded information into [[a]]

~~decoded bit vector~~ message bits estimated values and ~~a decoded probability vector~~ message bits reliabilities represented by log-bit likelihoods, each decoding block comprising:

a soft-output device for processing receiving the channel signals with the coded information according to ~~a code word probability vector into a code bit information vector and an associated code bit reliability vector~~ and receiving any incoming code bits reliabilities, and for providing codeword bits estimated values and corresponding outgoing code bits reliabilities represented by log-bit likelihoods therefrom; and

a Reed-Muller decoding device for decoding the ~~code bit information vector and the associated code bit reliability vector~~ code bits estimated values and for using the code bits reliabilities to provide estimated values of message bits

and to provide corresponding message bits reliabilities represented by log-bit likelihoods therefrom; and

an assembler device ~~between each~~ coupling an initial coding block to a subsequent decoding block for ~~processing the code bit information vector and the associated code bit reliability vector~~ converting the message bits reliabilities from a previous the initial decoding block ~~into a codeword vector and an associated codeword reliability vector~~ to incoming code bits reliabilities represented by log-bit likelihoods corresponding to code bits in the corresponding channel coded signal for a next the subsequent decoding block.

13. (Currently amended) The system of claim 12[[,]] wherein the coded information is interleaved, the system further compriseses[[[:]] a de-interleaver coupling a soft-output device to a Reed-Muller decoding device in a decoding block for ~~re-ordering a bit sequence of the code bit information vector and the associated code bit reliability vector~~ de-interleaving the code bits estimated values prior to the decoding thereof by the Reed Muller decoding device.

14. (Currently amended) The system of claim 12 [[,]] wherein the coded information is interleaved, the system further comprising[[[:]] an interleaver ~~between decoding blocks in the assembler~~ for randomly re-ordering reordering the codeword vector and the associated codeword reliability vector message bits reliabilities.

15. (Currently amended) The system of claim 12 wherein ~~each the~~ the soft-output device of each of the two or more plurality of decoding blocks has two inputs, a first input for receiving the channel signals having therein the coded information and a second input for receiving [[a]] ~~code word reliability vector bits reliabilities represented by log-bit likelihoods~~, and wherein each such soft-output device has two outputs; ~~the code bit information vector and the associated code bit reliability vector~~ for providing at one the code

bits estimated values and at the other the corresponding code bits reliabilities represented by log-bit likelihoods.

16. (Currently amended) The system of claim 15 wherein the second input of the soft-output device of a first decoding block of the ~~two or more~~ plurality of decoding blocks having only its outputs coupled to another decoding block is a receives none or only zero vector values.

17. (Currently amended) A method of decoding channel signals containing information in message bits encoded using Reed-Muller codes to provide code bits implemented by a message passing message bits algorithm based on a Reed Graph, the method comprising:

computing determining initial message bit likelihoods for each message bit in [[a]] an initial code bit sequence of a corresponding Reed-Muller coded channel signal;  
updating the determining subsequent code bit likelihoods according to based on the message bit likelihoods; and  
re-computing the determining subsequent message bit likelihoods according to the updated based on the subsequent code bit likelihoods and the Reed-Muller coded channel signal.

18. The method of claim 17 wherein the method is repeated to improve decoding accuracy.

19. (Canceled)

20. (Currently amended) The method of claim ~~19~~, 17 wherein the ~~code bit reliability vector is a log-bit-likelihood~~ message bit likelihoods and the code bit likelihoods are log-bit likelihoods.

21. (Currently amended) A iterative decoding system for decoding a received channel signal containing Reed-Muller encoded information, the system comprising:

a sequence of decoding blocks for processing the received signal into a decoded signal,  
each decoding block comprising:

a ~~soft-input-output~~ device for processing the encoded information from the  
encoded signal into code bits and associated code bit likelihoods; and  
a ~~reed-muller~~ Reed-Muller message passing device for processing the code bits  
and the associated code bit likelihoods into message bits and message  
bit likelihoods; and

~~connections~~ coupling means between an output of the ~~reed-muller~~ Reed-Muller  
message passing device in a decoding block and an input for a ~~next~~ soft-input-  
output device in the next decoding block in the sequence, wherein a ~~sequentially~~  
~~last~~ decoding block in the sequence coupled to other decoding blocks in the  
sequence only by its soft-output device produces an output the decoded signal.

22. (Currently amended) The iterative decoding system of claim 21 wherein the message bit  
likelihoods corresponding to a message bit are represented as log likelihood ratios ~~for the message bit~~.

23. (Currently amended) The iterative decoding system of claim 21 wherein the received channel  
signal is an interleaved signal, the system further comprising ~~an interleaver~~ a de-interleaver disposed  
both between each ~~soft-input-output~~ device and each ~~reed-muller~~ Reed-Muller message passing device  
and an interleaver disposed between each consecutive decoding block blocks in the sequence of  
decoding blocks.

24. (Previously presented) The iterative decoding system of claim 21 wherein the system is  
implemented in a circuit.

25. (Previously presented) The iterative decoding system of claim 21 wherein the connections are logical connections.

26. (New) The system of claim 3 wherein the assembler coupled to the first Reed-Muller message passing device is a first assembler and the second Reed-Muller message passing device also provides subsequent stage message bits reliabilities corresponding to the estimated values of the subsequent stage message bits, and further comprising a second assembler, the second assembler coupled to the second Reed-Muller message passing device for converting the subsequent stage message bits reliabilities to next stage incoming code bits reliabilities corresponding to code bits in the corresponding channel coded signal; and the plurality of soft-output devices having a third soft-output device, the third soft-input device coupled to said second assembler for providing next stage code bits estimated values and for providing next stage outgoing code bits reliabilities from the corresponding channel coded signal and the corresponding next stage incoming code bits reliabilities, and the plurality of Reed-Muller message passing devices having a third Reed-Muller message passing device, the third Reed-Muller message passing device coupled to the third soft-output device for decoding the next stage code bits estimated values and for using the next stage outgoing code bits reliabilities to provide next stage message bits reliabilities.

27. (New) The method of claim 10 further comprising passing at least a representation of the subsequent stage message bits reliabilities to a third soft-output device and generating next stage code bits estimated values and corresponding next stage code bits outgoing reliabilities from the corresponding channel coded signal and the representation of the corresponding subsequent stage message bits reliabilities using the third soft-output device.

28. (New) The system of claim 12 further comprising another an assembler device coupling at least the subsequent coding block to a next decoding block for converting the message bits reliabilities from



the subsequent decoding block to incoming code bits reliabilities represented by log-bit likelihoods corresponding to code bits in the corresponding channel coded signal for the next decoding block.